Learning Aberrance Repressed Correlation Filters for Real-Time UAV Tracking Supplementary Material

Ziyuan Huang[1], Changhong Fu[2,*], Yiming Li[2], Fuling Lin[2] and Peng Lu[3]
[1]School of Automotive Studies, [2]School of Mechanical Engineering, Tongji University, China
[3]Adaptive Robotic Controls Lab, Hong Kong Polytechnic University, Hong Kong, China
tjhuangziyuan@gmail.com, changhongfu@tongji.edu.cn, peng.lu@polyu.edu.hk

1. Introduction

In this supplementary material, additional results from experiments conducted in the paper on dataset UAV123@10fps [4], DTB70 [3] and UAVDT [1] are presented as follows.

More visualization of response map differences: To more comprehensively compare BACF [2] with ARCF-H, more visualization of response map differences on datasets UAVDT and DTB70 is illustrated in Fig. 1, demonstrating the superior aberrance repression effect of the ARCF-H tracker.

Full attribute-based evaluation: Complete attribute based evaluation of precision and success rate on all 12 attributes of UAV123@10fps [4], 10 attributes of DTB70 [3] and 9 attributes of UAVDT [1] is presented to compare proposed ARCF-H and ARCF-HC to other top hand-crafted based trackers respectively in Fig. 2 - 7. On most attributes from all three benchmarks, the proposed ARCF-H and ARCF-HC tracker has demonstrated a competitive performance.

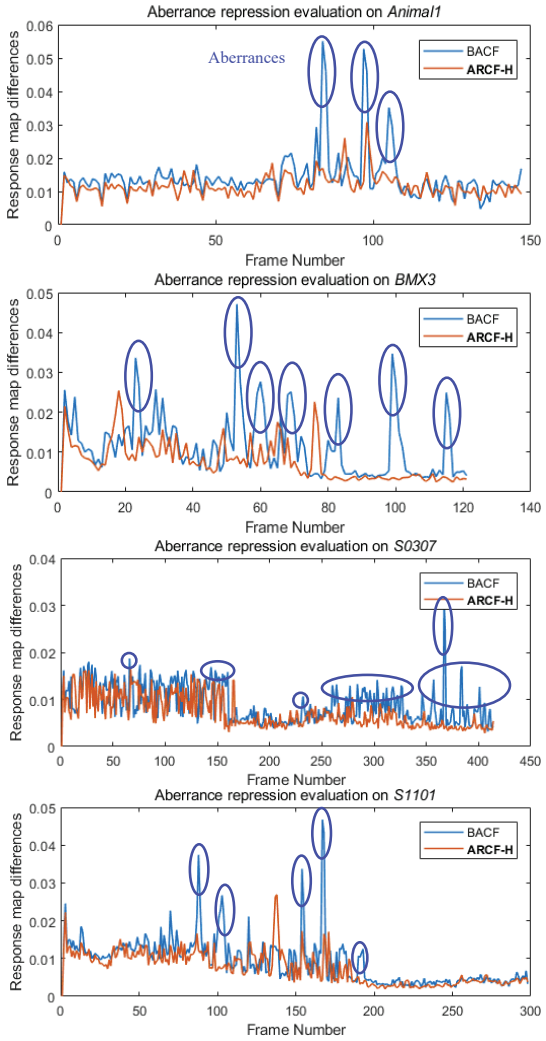

Figure 1. Comparison of response map differences between BACF tracker and ARCF-H tracker on UAVDT and DTB70 dataset, specifically on *Animal1*, *BMX3*, *S0307* and *S1101*. The proposed ARCF-H tracker has remarkably repressed aberrances that can possibly cause lost of object.

References

[1] Dawei Du, Yuankai Qi, Hongyang Yu, Yifan Yang, Kaiwen Duan, Guorong Li, Weigang Zhang, Qingming Huang, and Qi Tian. The unmanned aerial vehicle benchmark: object detection and tracking. In *Proceedings of the European Conference on Computer Vision (ECCV)*, pages 370–386, 2018. 1

[2] Hamed Kiani Galoogahi, Ashton Fagg, and Simon Lucey. Learning background-aware correlation filters for visual tracking. In *Proceedings of the IEEE International Conference on Computer Vision*, pages 1135–1143, 2017. 1

[3] Siyi Li and Dit-Yan Yeung. Visual object tracking for unmanned aerial vehicles: A benchmark and new motion models. In *Thirty-First AAAI Conference on Artificial Intelligence*, 2017. 1

[4] Matthias Mueller, Neil Smith, and Bernard Ghanem. A benchmark and simulator for uav tracking. In *European conference on computer vision*, pages 445–461. Springer, 2016. 1

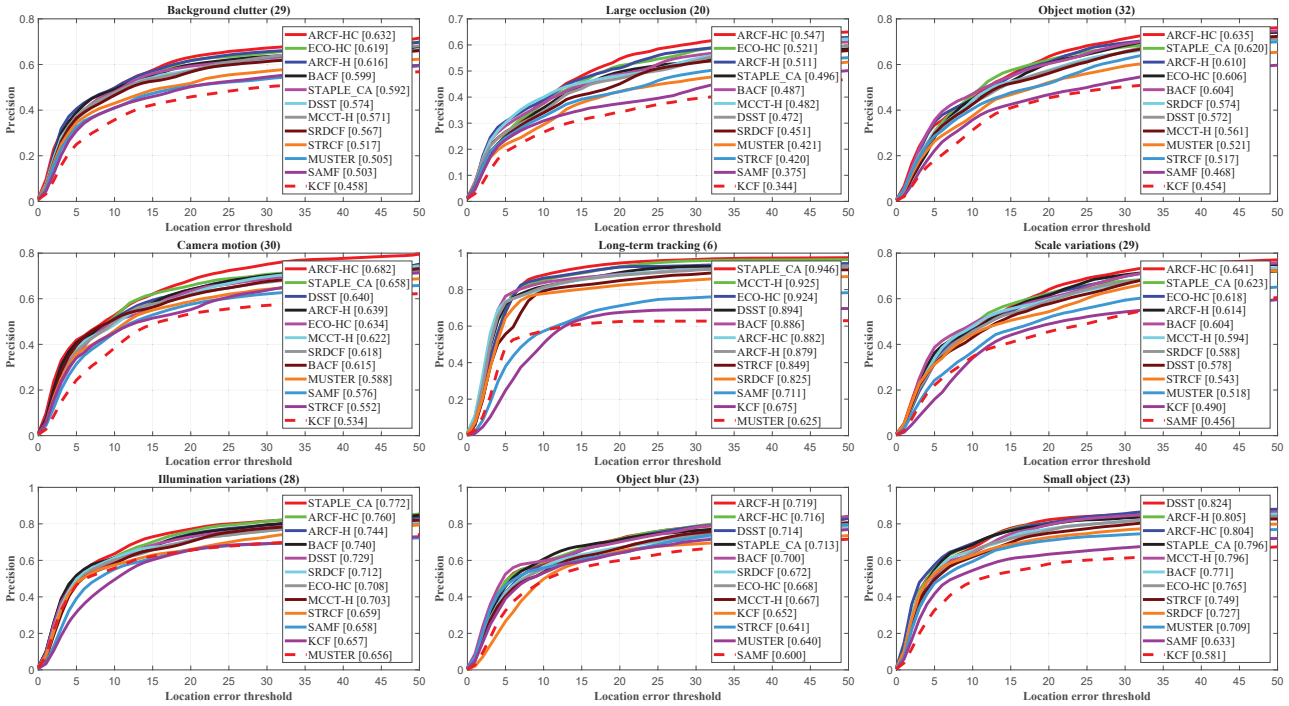

Figure 2. Attribute based evaluation on UAVDT. Precision plots compare ARCF and ARCF-H to other hand-crafted based trackers on UAVDT dataset. ARCF-H and ARCF-HC achieved a competitive performance on most attributes.

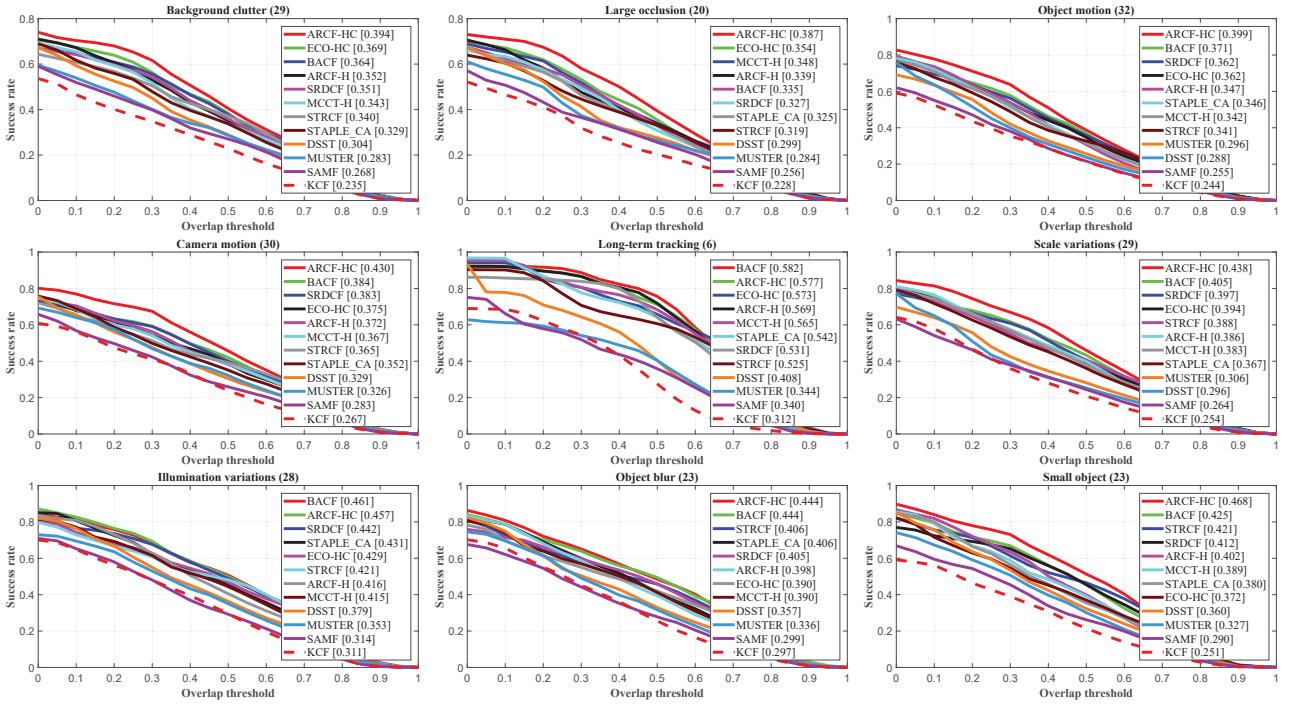

Figure 3. Attribute based evaluation on UAVDT. Success plots compare ARCF and ARCF-H to other hand-crafted based trackers on UAVDT dataset. ARCF-H and ARCF-HC achieved a competitive performance on most attributes.

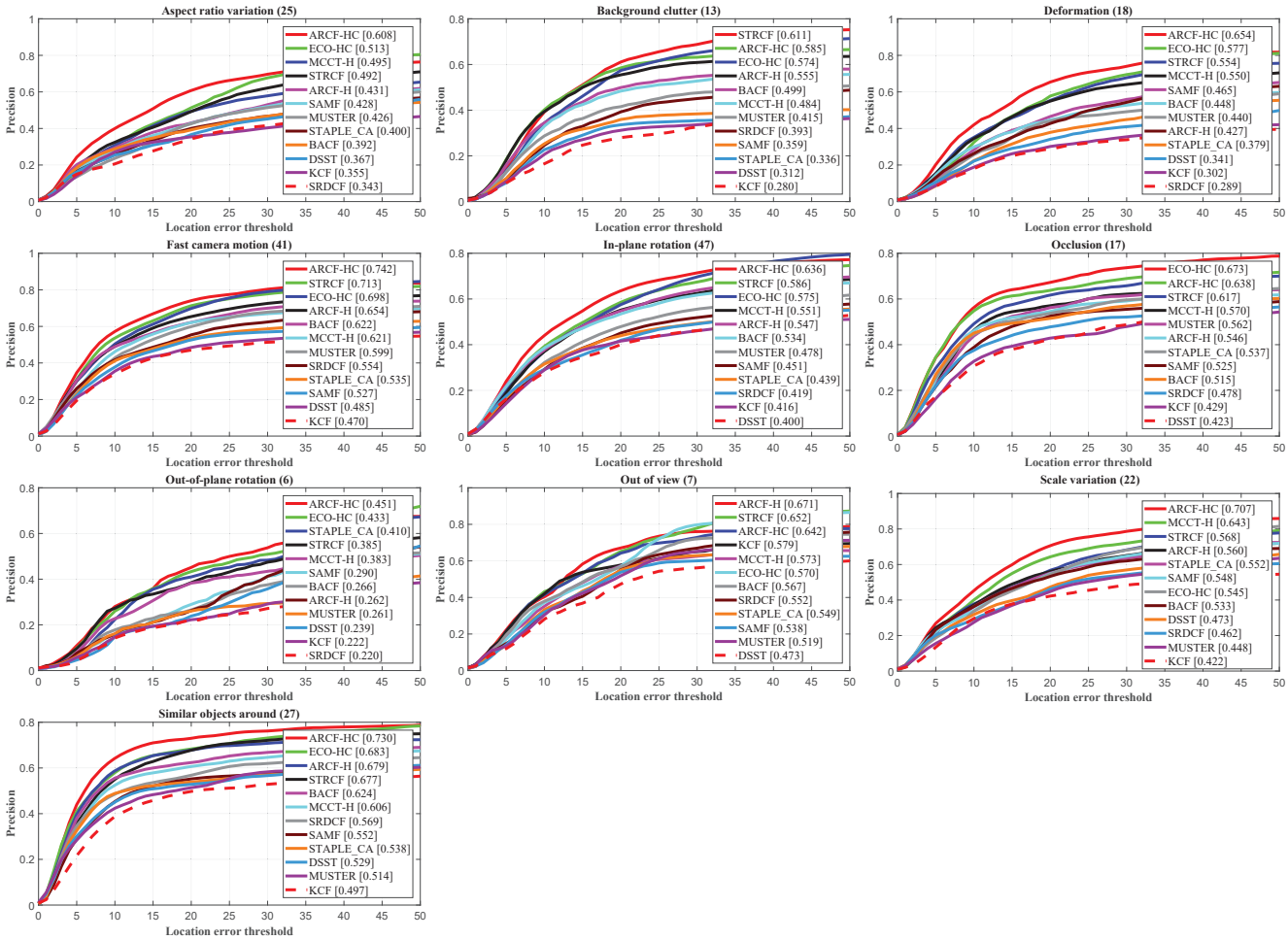

Figure 4. Attribute based evaluation on DTB70. Precision plots compare ARCF and ARCF-H to other hand-crafted based trackers on DTB70 dataset. ARCF-H or ARCF-HC achieved on almost all attributes the best performance among all hand-crafted feature based trackers.

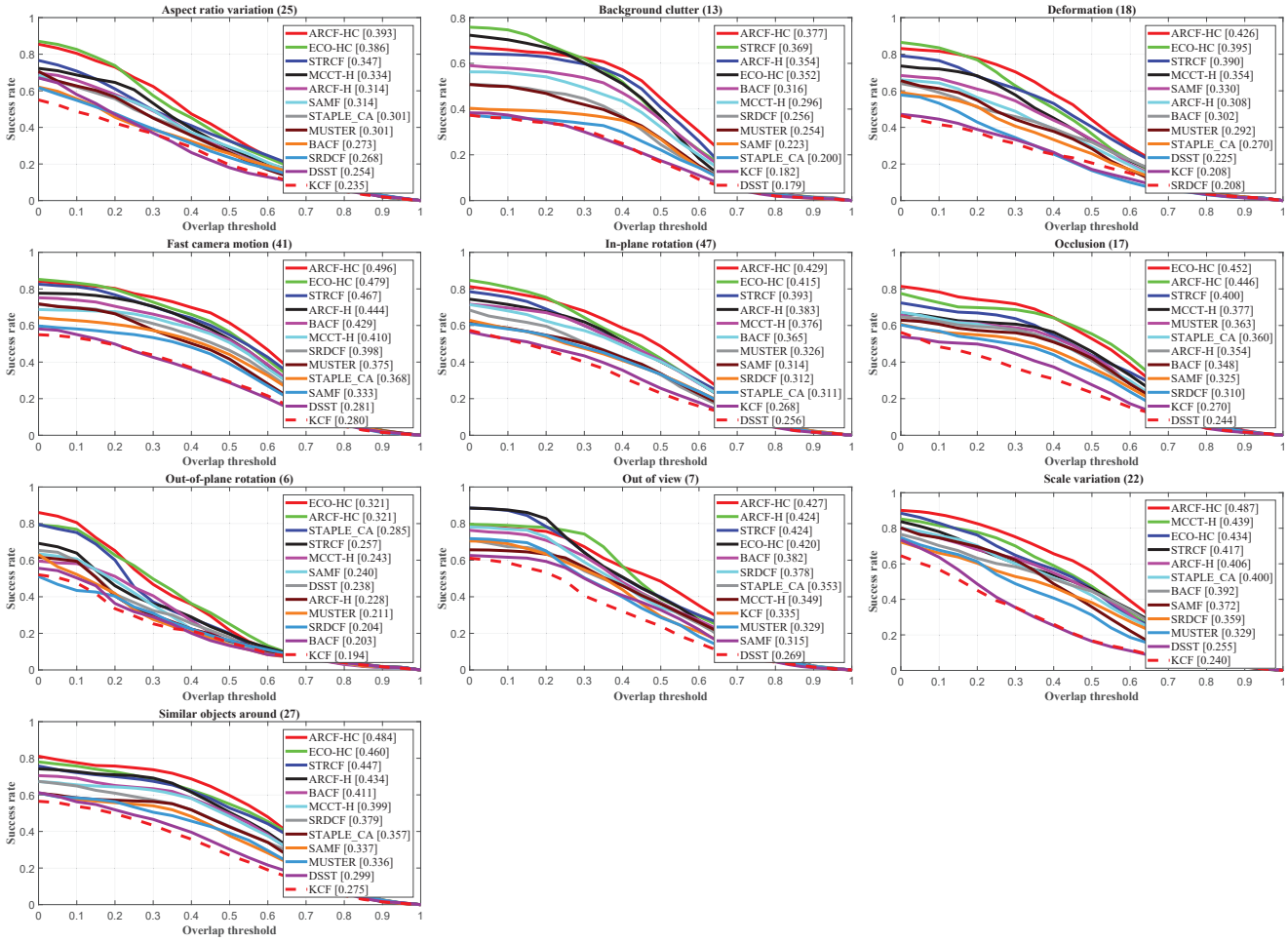

Figure 5. Attribute based evaluation on DTB70. Success plots compare ARCF and ARCF-H to other hand-crafted based trackers on DTB70 dataset. ARCF-H or ARCF-HC achieved on almost all attributes the best performance among all hand-crafted feature based trackers.

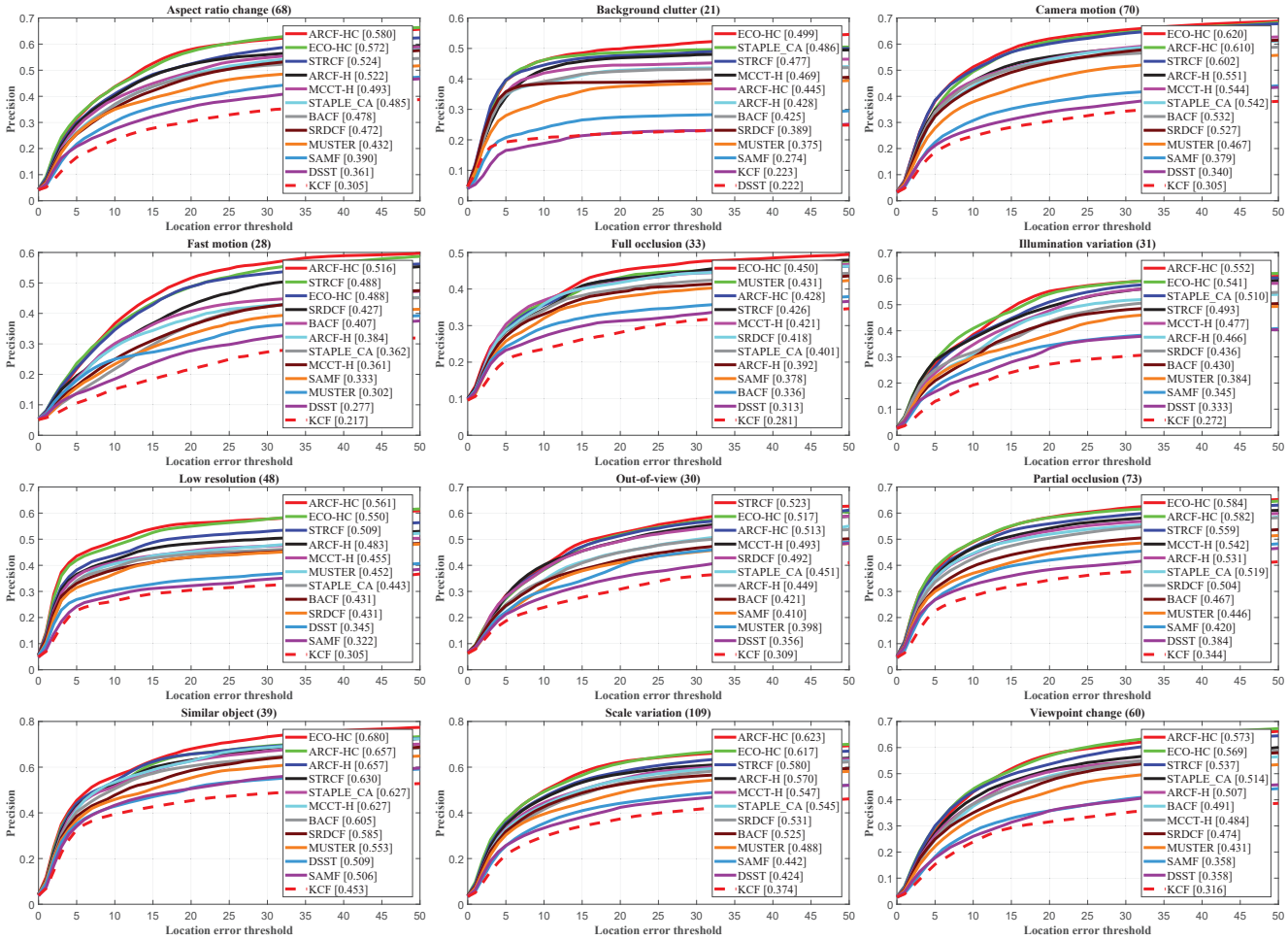

Figure 6. Attribute based evaluation on UAV123. Precision plots compare ARCF and ARCF-H to other hand-crafted based trackers on UAV123 dataset. ARCF-H and ARCF-HC achieved a competitive performance on most attributes.

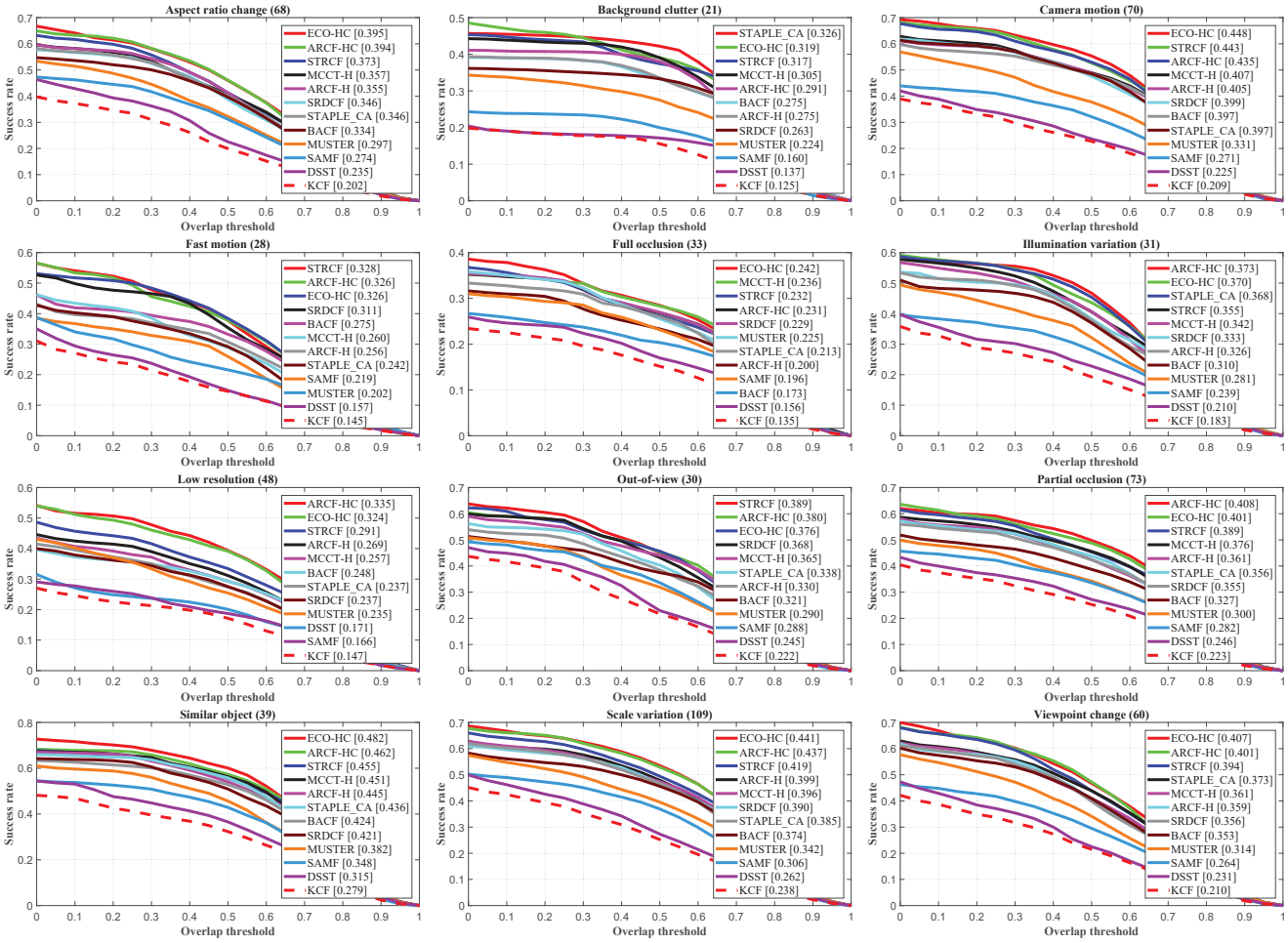

Figure 7. Attribute based evaluation on UAV123. Success plots compare ARCF and ARCF-H to other hand-crafted based trackers on UAV123 dataset. ARCF-H and ARCF-HC achieved a competitive performance on most attributes.